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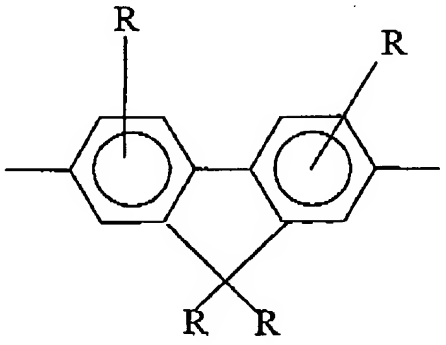
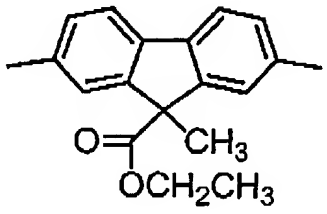
Application No.: 10/809,737
Docket No.: PE0667 US DIV

Listing of Claims

1. (Currently Amended) A copolymer comprising at least one first monomeric unit and at least one second monomeric unit, wherein the at least one first monomeric unit has a formula selected from the group consisting of Formulae I and I(a)

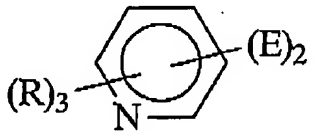


(I)



I(a)

and the at least one second monomeric unit is selected from 6-membered-ring heteroaromatic groups having Formula III

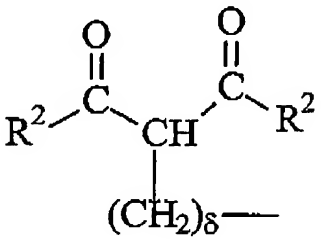


(III)

where:

in each of Formulae I and III:

R is a substituent on a carbon atom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl, heteroaryl, F, -CN, $-OR^1$, $-CO_2R^1$, $-C_\psi F_\lambda$, $-OC_\psi H_\theta F_\lambda$, $-SR^1$, $-N(R^1)_2$, $-P(R^1)_2$, $-SOR^1$, $-SO_2R^1$, $-NO_2$, and beta-dicarbonyls having Formula XII



(XII)

or adjacent R groups together can form a 5- or 6-membered cycloalkyl, aryl, or heteroaryl ring,

such that:

R^1 is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from alkyl, aryl, heteroalkyl and heteroaryl; and

ψ is an integer between 1 and 20, and θ and λ are integers satisfying Equation A1 below:

$$\theta + \lambda = 2\psi + 1; \qquad \text{(Equation A1);}$$

in Formula III:

E can be the same or different at each occurrence and is a single bond or a linking group selected from arylene and heteroarylene;

in Formula XII:

R^2 is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

δ is 0 or an integer from 1 to 12; with the proviso that:

when R in formula III is hydrogen, alkyl, F, -CN, $-OR^1$, or CO_2R^1 the copolymer further comprises end-capping groups that are aromatic.

2. (Original) The copolymer of Claim 1, wherein R groups in one or more of the at least one first monomeric unit are independently selected from alkyl groups having 1 to 30 carbon atoms; heteroalkyl groups having 1-30 carbon atoms and one or more heteroatoms

of S, N, or O; aryl groups having from 6 to 20 carbon atoms, and heteroaryl groups having from 2 to 20 carbon atoms and one or more heteroatoms of S, N, or O.

3. (Original) The copolymer of Claim 1 that excludes any vinylene monomeric units.

4. (Previously Presented) The copolymer of Claim 1 wherein each R group in each of Formula I, Formula 1(a), and Formula III is selected from:

hydrogen;

alkyl;

aryl;

heteroalkyl;

heteroaryl;

F;

-CN;

$-P(R^1)_2$ and $-SOR^1$, where R^1 is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from alkyl, aryl, heteroalkyl and heteroaryl;

$-NO_2$;

a beta-dicarbonyl having Formula XII;

$-C_\psi H_\theta F_\lambda$;

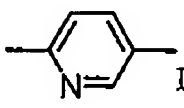
$-OC_\psi H_\theta F_\lambda$;

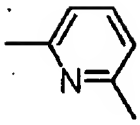
$-OR^1$, $-CO_2R^1$, $-SR^1$, $-N(R^1)_2$, and $-SO_2R^1$ where R^1 is a straight chain or branched alkyl of more than 20 carbons or a straight chain or branched heteroalkyl.

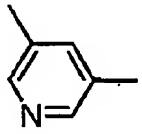
5. (Original) The copolymer of Claim 1 wherein the at least one of the R groups in one or more of the at least one first monomeric unit is independently selected from linear and branched n-butyl groups; linear and branched iso-butyl groups; linear and branched pentyl groups; hexyl groups, and octyl groups with and without olefinic unsaturation; phenyl groups, thiophene groups, carbazole groups, alkoxy groups, phenoxy groups and cyano groups.

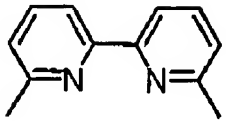
6. (Original) The copolymer of Claim 1 wherein at least one of the R groups in one or more of the at least one first monomeric unit are independently selected from H, C_6-C_{12} alkoxy, phenoxy, C_6-C_{12} alkyl, phenyl and cyano.

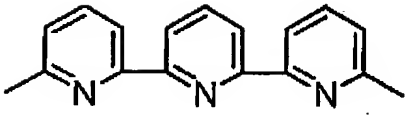
7. (Previously Presented) The copolymer of Claim 1 wherein one or more of the at least one second monomeric unit is selected from Formulae III(a) through III(g),

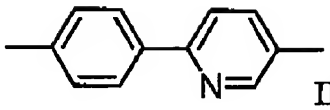

III(a)

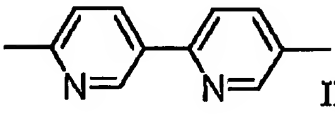

III(b)


III(c)


III(d)


III(e)

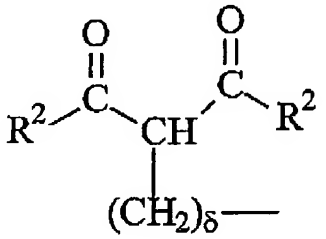

III(f)


III(g)

8. (Cancelled).

9. (Previously Presented) The copolymer of Claim 1, wherein one or more of the at least one second monomeric unit has Formula III wherein R is selected from:

partially or fully fluorinated alkyl groups having from 1 to 12 carbon atoms;
alkoxy groups having from 1 to 12 carbon atoms;
esters having from 3 to 15 carbon atoms;
$-SR^1$, $-N(R^1)_2$, $-P(R^1)_2$, $-SOR^1$, $-SO_2R^1$, where R^1 is an alkyl group having from 1 to 12 carbon atoms;
$-NO_2$; and
beta-dicarbonyls having Formula XII



(XII)

where:

in Formula XII:

R^2 is an alkyl group having from 1 to 12 carbon atoms and δ is 0, 1, or 2.

10. (Original) The copolymer of Claim 1, where one or more of the at least one second monomeric unit has Formula III wherein:

R groups are selected from hydrogen, C_6-C_{12} alkyl groups, C_6-C_{20} aryl groups, and C_2-C_{20} heteroaryl groups; and

E linking groups are selected from pyridinediyl (-C_5H_4N-) and bipyridinediyl (-C_5H_4N- C_5H_4N-).

11 -13. (Cancelled).

14. (Original) An electronic device comprising at least one electroactive layer comprising the copolymer of Claim 1.

15. (Original) The device of Claim 14, wherein the device comprises a hole injection/transport layer comprising the copolymer of Claim 1.

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16. (Original) The device of Claim 14, wherein the device comprises an electron injection/transport layer comprising the copolymer of Claim 1.

17. (Original) The device of Claim 14, wherein the electroactive layer comprises a light-emitting material comprising the copolymer of Claim 1.

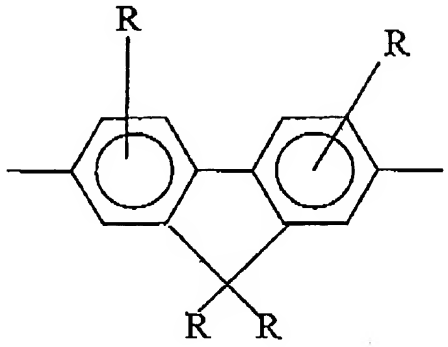
18. (Cancelled).

19. (Original) The device of Claim 14, wherein the device is selected from a light-emitting device, a photodetector, and a photovoltaic device.

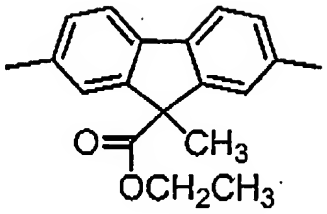
20. (Original) The device of Claim 14, wherein the device is an electroluminescent display.

21. (Currently Amended) A light-emitting device comprising at least one light-emitting layer comprising a copolymer having the following formula

at least one first monomeric unit and at least one second monomeric unit, wherein the at least one first monomeric unit has a formula selected from the group consisting of Formulae I and I(a)

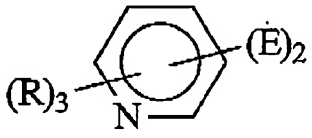


(I)



I(a)

and the at least one second monomeric unit is selected from 6-membered-ring heteroaromatic groups having Formula III



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where:

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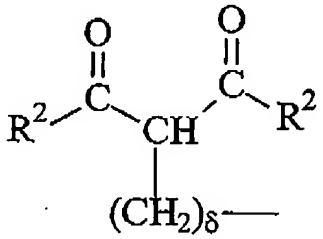

(XII)

or adjacent R groups together can form a 5- or 6-membered cycloalkyl, aryl, or heteroaryl ring,

such that:

R^1 is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from alkyl, aryl, heteroalkyl and heteroaryl; and

ψ is an integer between 1 and 20, and θ and λ are integers satisfying Equation A1 below:

$$\theta + \lambda = 2\psi + 1; \qquad \text{(Equation A1);}$$

in Formula III:

E can be the same or different at each occurrence and is a single bond or a linking group selected from arylene and heteroarylene;

in Formula XII:

R^2 is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

δ is 0 or an integer from 1 to 12.